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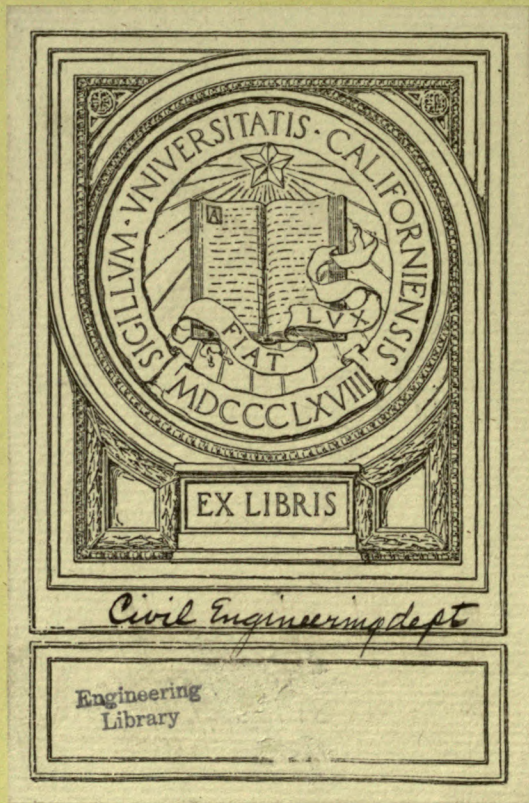
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# TRAVERSE TABLES

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R. L. GURDEN

UNIVERSITY OF CALIFORNIA  
DEPARTMENT OF CIVIL ENGINEERING  
BERKELEY, CALIFORNIA







# TRAVERSE TABLES.

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UP TO 100 OF DISTANCE.

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BY  
RICHARD LLOYD GURDEN,  
FORMERLY AUTHORISED SURVEYOR  
FOR  
THE GOVERNMENTS OF NEW SOUTH WALES AND VICTORIA.

*Published with Concurrence of the Surveyors-General for New South Wales and Victoria.*

UNIV. OF  
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## INTRODUCTION.

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IN offering the present Volume to the consideration of his brother Surveyors, the Author would simply remark, that it owes its existence to his own felt want of such a compilation.

Whilst occupied on the Government Survey of Victoria, the inadequacy for practical purposes of the existing published Computations forced itself so strongly upon him, that he resolved, notwithstanding the pressure of professional engagements, to prepare a set of Traverse Tables which should more nearly answer both his own requirements and those of his colleagues—a determination which has resulted in the publication of the ensuing pages.

The DISTINCTIVE FEATURES of these Tables, and the method of their employment, may be briefly summarised as follows:—

I. The Tables are calculated to Single Minutes and to 100 of Distance.

II. The Traverses are given to four places of decimals, so that the Sines and Cosines for a distance of twelve miles can be ascertained correctly to within half an inch.

III. The angles 0 to 45° are given at the top of the page, and 45° to 90° at the foot; the distances 1 to 100 are in the outside columns; and the quantity sought is found at the intersection of the column containing the required angle and the line on which is the required distance.

IV. The whole numbers are given in the two centre columns *only*, and from these the decimal quantities increase towards the edge of the page, the Sines increasing to the right, and the Cosines to the left. When the whole number changes in the line, attention is directed to it by a black diamond; therefore, when a black diamond is found, it is to be understood that it signifies a cipher, and that the whole number of that value (*i.e.* containing the diamond), and all to the right on the same line, must be increased by *one*. For example:—

	Cos.	Sin.
0° 42' dist. 81	80'9940	81'9896
0° 43' ,, 81	80'9937	82'0131
0° 44' ,, 81	80'9934	82'0367

The simplicity of this plan has so many advantages, that, in the Author's opinion, it more than counterbalances the commoner one of repeating the whole numbers at the outside of the page as well as in the centre.

V. In the following Table, the whole of the figures required to be written for the finding of Sines and Cosines are shown in a circuit of twelve lines:—

Bearing.	Reduced Bearing.	Distance.	Latitude.	Departure.	Latitude.		Departure.	
					N.	S.	E.	W.
90° 16'	S. 89° 44' E.	9326	43° 28' 12	9299° 90 26' 00		43° 40'	9325° 90	
			<u>43° 40'</u>	<u>9325° 60</u>				
63° 27'	N. 63° 27' E.	460			205° 61'		411° 49'	
16° 28'	N. 16° 28' E.	1022	958° 99 21' 10	283° 46 6' 24	980° 09'		289° 70'	
			<u>980° 09'</u>	<u>289° 70'</u>				
136° 25'	S. 43° 35' E.	1270	969° 25 50' 71	827° 29 48' 26				
			<u>919° 96'</u>	<u>875° 55'</u>		919° 96'	875° 55'	
203° 15'	S. 23° 15' W.	990				909° 60'		390° 80'
161° 3'	S. 18° 57' E.	1275	1134° 96 70' 94	389° 69 24' 36		1205° 90'	414° 05'	
			<u>1205° 90'</u>	<u>414° 05'</u>				
136° 46'	S. 43° 14' E.	1153	801° 43 38' 61	753° 47 36' 30		840° 04'	789° 77'	
			<u>840° 04'</u>	<u>789° 77'</u>				
174° 43'	S. 5° 17' E.	1180	1095° 33 79' 66	101° 29 7' 37		1174° 99'	108° 66'	
			<u>1174° 99'</u>	<u>108° 66'</u>				
234° 20'	S. 54° 20' W.	1563	874° 60 36' 73	1218° 63 51' 18		911° 33'		1269° 81'
			<u>911° 33'</u>	<u>1269° 81'</u>				
196° 17'	S. 16° 17' W.	881	844° 70 96	246° 74 28		845° 66'		247° 02'
			<u>845° 66'</u>	<u>247° 02'</u>				
270° 0'	W.	7708						7708° 00'
335° 21'	N. 24° 39' W.	6233	5635° 01 29' 99	2585° 86 13' 76	5665° 00'			2599° 62'
			<u>5665° 00'</u>	<u>2599° 62'</u>				
					<u>6850° 70'</u>	<u>6850° 88'</u>	<u>12215° 12'</u>	<u>12215° 25'</u>

The angles sought in the Tables are those under the head "Reduced Bearing."

For the first line, opening the Tables at 89° 44' :

the Cosine and Sine for 93 chs. are first found, . . . . . 43° 28' and 9299° 90  
then for 26 lks., . . . . . 12 26° 00

and these being added up, . . . . . 43° 40' 9325° 90'

the results are carried into the S. and E. columns.

In the next line, the book is opened at 63° 27', and for Distance 460 chs. The Cosine and Sine are found at once, and copied into the N. and E. columns.

In the third line, the book is opened at 16° 28', and at a Distance 1000 :

the Cosine and Sine copied, . . . . . 958° 99' and 283° 46  
then for 22 lks., . . . . . 21' 10 6' 24

and these being added up, . . . . . 980° 09' 289° 70'

the results are carried into the N. and E. columns.

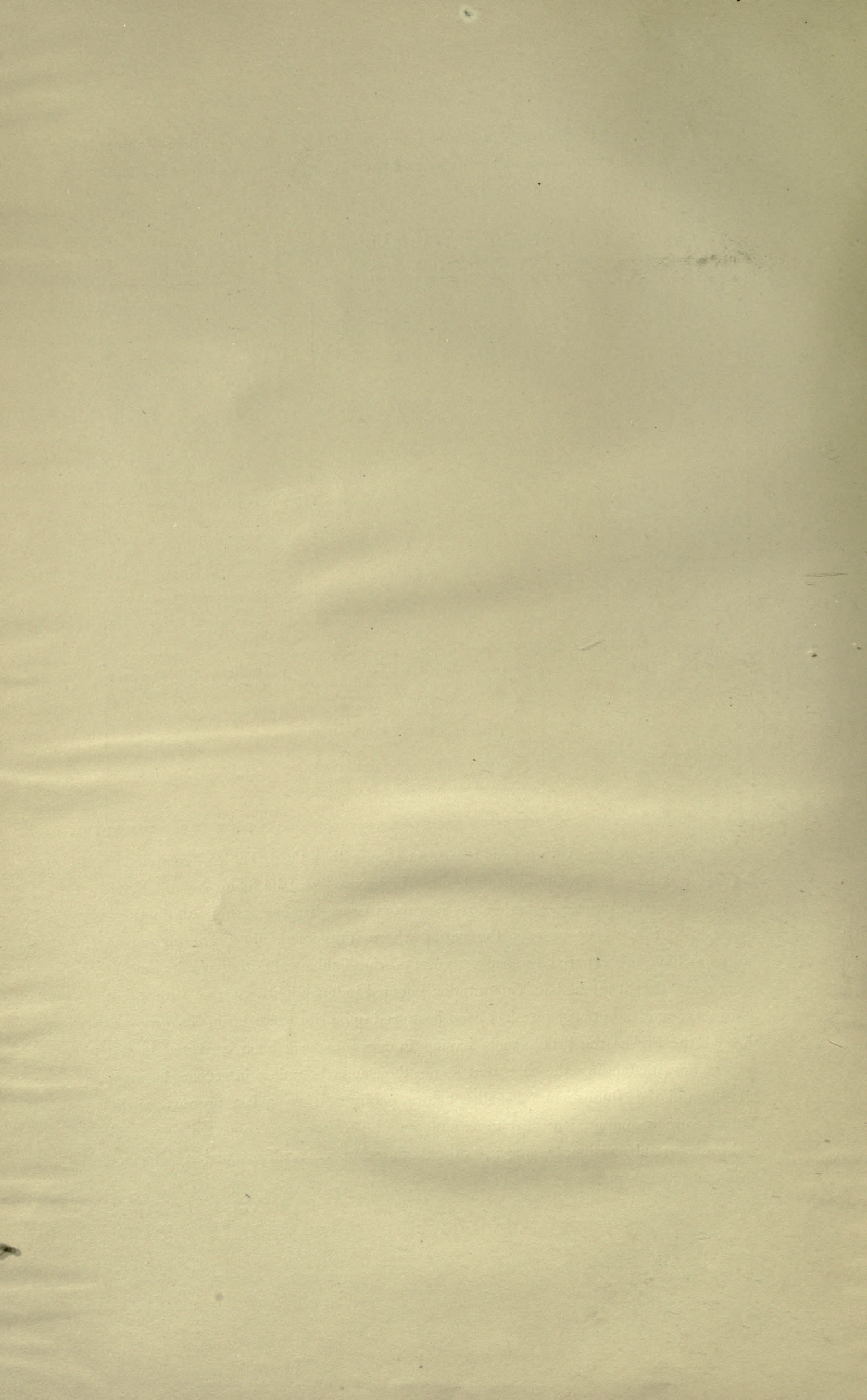
The trifling calculation required is shown in full in the columns "Latitude" and "Departure," that for each line being comprised in *one* page of the book.

VI. The great advantage of these Traverse Tables over Logarithms—both as regards simplicity and economy of labour in calculating—will be seen at a glance from the following comparative Table:—

CALCULATIONS REQUIRED FOR FINDING SINES AND COSINES.																				
	By TRAVERSE TABLES.	By LOGARITHMS.																		
63° 27' — 4600 links.	<p>2056'10 — 4114'91</p> <p><i>One opening of Traverse Tables.</i></p> <p><i>No calculation required.</i></p>	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: right;">4114'91</td><td style="text-align: right;">5</td></tr> <tr><td></td><td style="text-align: right;">93</td></tr> <tr><td style="text-align: right;">63° 27'</td><td style="text-align: right;">3'6143598</td></tr> <tr><td style="text-align: right;">4600</td><td style="text-align: right;">9'9516020</td></tr> <tr><td></td><td style="text-align: right;">3'6627578</td></tr> <tr><td></td><td style="text-align: right;">9'6502868</td></tr> <tr><td style="text-align: right;">2056'10</td><td style="text-align: right;">3'2130446</td></tr> <tr><td></td><td style="text-align: right;">42</td></tr> <tr><td></td><td style="text-align: right;">4</td></tr> </table> <p>(a.) The Logarithm book has to be opened in four different places.</p> <p>(b.) Two separate additions have to be made.</p> <p>(c.) In taking out natural numbers, proportional parts have to be resorted to, in order to find figures of second decimal place.</p> <p>(d.) Besides the calculations, 48 more figures have to be written in doing the work by Logarithms than by Traverse Tables.</p>	4114'91	5		93	63° 27'	3'6143598	4600	9'9516020		3'6627578		9'6502868	2056'10	3'2130446		42		4
4114'91	5																			
	93																			
63° 27'	3'6143598																			
4600	9'9516020																			
	3'6627578																			
	9'6502868																			
2056'10	3'2130446																			
	42																			
	4																			
26° 29' — 9987 links.	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: right;">(99 chs.) 8861'13 — 4414'78</td><td></td></tr> <tr><td style="text-align: right;">(87 lks.) 77'87      38'80</td><td></td></tr> <tr><td style="text-align: right;"><hr style="width: 50%; margin-left: 0;"/></td><td></td></tr> <tr><td style="text-align: right;">8939'00      4453'58</td><td></td></tr> </table> <p><i>One opening of Traverse Tables only required.</i></p> <p>In column 26° 29' the Sin. and Cos. for 99 are first found, then in the same column the Sin. and Cos. for 87; these added together give the result.</p>	(99 chs.) 8861'13 — 4414'78		(87 lks.) 77'87      38'80		<hr style="width: 50%; margin-left: 0;"/>		8939'00      4453'58		<p>A calculation similar to that given above is necessitated by Logarithms.</p>										
(99 chs.) 8861'13 — 4414'78																				
(87 lks.) 77'87      38'80																				
<hr style="width: 50%; margin-left: 0;"/>																				
8939'00      4453'58																				

In conclusion, the Author would express a hope that these Tables—compiled in the first instance, as already indicated, for private use—will be found helpful by all engaged in active practice, whether as Surveyors or as Engineers, not only in these Colonies, but in every part of the world where Traverse Tables are employed. No pains have been spared to ensure accuracy—the Tables exhibiting results arrived at by two different methods of computation pursued independently by the Author and assistants; and the utmost care has been bestowed upon the work during its progress through the Press—the Proof-sheets having in every instance been corrected by the writer, notwithstanding the fact that some thousands of miles intervene between himself and the Publishers. Finally, before publication, as a last precaution, the Tables were recomputed a third time, and the whole work was subjected to a rigid and most careful revision, leaving it, as the Author thinks himself justified in believing, absolutely free from error.

R. L. GURDEN,  
KERANG, VICTORIA.



TRAVERSE TABLES.

Table with columns for degrees (0° to 89°) and minutes (0' to 59'), and rows for Cosine and Sine values. The table is split into Cosine and Sine sections.



TRAVERSE TABLES.

Table with columns for degrees (0° to 89°) and minutes (00' to 31'). It contains two main sections: COSINE (left) and SINE (right). Each section has a grid of numerical values. The cosine values decrease from 1.0000 at 0° to 0.1736 at 89°. The sine values increase from 0.0000 at 0° to 0.9823 at 89°. The table is organized into rows for each degree and columns for each minute.





TRAVERSE TABLES.

Main table containing Cosine and Sine values for angles from 0 to 90 degrees. The table is organized into columns for degrees (0 to 90) and minutes (40 to 11), with rows for cosine and sine values.

TRAVERSE TABLES.

Table with columns for degrees (0° to 89°) and minutes (50' to 59'). It contains two main sections: 'COSINE.' on the left and 'SINE.' on the right. Each section has a grid of numerical values corresponding to the degree and minute markings. The table is symmetric, with cosine values decreasing from 1.0000 at 0° to 0 at 90°, and sine values increasing from 0 at 0° to 1.0000 at 90°.

89°

SINE.

COSINE.

89°

TRAVERSE TABLES.

Table of trigonometric values for angles from 1 degree to 88 degrees. The table is divided into four quadrants: 1 degree to 90 degrees (top), 90 degrees to 180 degrees (bottom), and 180 degrees to 270 degrees (left), and 270 degrees to 360 degrees (right). Each quadrant contains columns for degrees and minutes (0 to 9) and rows for degrees and minutes (1 to 90). The values are arranged in a grid with 'COSINE.' and 'SINE.' labels at the top and bottom of each quadrant.





TRAVERSE TABLES.

Table of Trigonometric Functions (Sine and Cosine) for angles 1° to 88°. The table is organized into two main sections: Cosine (top) and Sine (bottom). Each section contains columns for degrees and minutes, and rows for degrees and minutes. Values are provided for every 1-minute interval.







TRAVERSE TABLES.

Table with columns for degrees (2° to 87°), Cosine, and Sine. It contains numerical values for each minute of an arc.

TRAVERSE TABLES.

Table with columns for degrees (2° to 87°) and minutes (10' to 19'). It is divided into two main sections: COSINE (left) and SINE (right). Each section contains numerical values for every minute of the degree. The SINE section also includes a small table for degrees 87° to 90° at the bottom right.

TRAVERSE TABLES.

Table of trigonometric values for angles from 2° to 87°. Columns are labeled 'COSINE.' and 'SINE.' with sub-columns for minutes (20' to 29'). The table is symmetric around 45°.

TRAVERSE TABLES.

Table with columns for degrees (2° to 87°) and cosine/sine values. The table is split into two main sections: COSINE (left) and SINE (right). Each section has a main header for the function and a sub-header for degrees. The data is presented in a grid format with values for each degree and minute.



TRAVERSE TABLES.

Table with columns for COSINE and SINE, degrees 2° to 87°, and minutes (50' to 1'). Includes values for angles 1-100 degrees and corresponding cosine/sine values.

TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 3° to 86°. Includes sub-columns for minutes (0' to 9') and seconds (60' to 51').









TRAVERSE TABLES.

Table with columns for degrees (3° to 86°) and minutes (0' to 60'), and rows for Cosine and Sine values. The table is symmetric and provides values for each minute interval.

TRAVERSE TABLES.

Table with columns for degrees (3° to 86°) and minutes (50' to 59'). It contains two main sections: 'COSINE.' and 'SINE.' with numerical values for each degree-minute combination. The table is structured as a grid with 49 rows and 40 columns, with degree markers at the corners and minute markers at the top and bottom.



TRAVERSE TABLES.

Table with columns for degrees (4° to 85°) and minutes (10' to 19'). It contains two main sections: COSINE and SINE. Each section has two columns of values corresponding to the minutes. The table is organized into rows for each degree, with values for each minute. The cosine values decrease from left to right, while the sine values increase from left to right.



TRAVERSE TABLES.

Table with columns for COSINE and SINE, rows for angles 4° to 85°, and sub-columns for minutes (30' to 21').









TRAVERSE TABLES.

Table with columns for degrees (5° to 84°) and minutes (10' to 19'). Rows contain Cosine and Sine values for each degree-minute combination.



TRAVERSE TABLES.

A large table of traverse tables showing Cosine and Sine values for angles from 5 degrees to 84 degrees. The table is organized into columns for degrees and minutes, with rows corresponding to the degree value. The Cosine values are on the left side and Sine values are on the right side of the central degree column.







TRAVERSE TABLES.

Table with columns for degrees (6° to 83°), Cosine, and Sine. Each degree section contains a grid of values for minutes (0' to 59'). The Cosine section is on the left and the Sine section is on the right. Values are arranged in a grid format for each minute.

TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 6° to 83°. Includes degree markings at 6° and 83° corners. The table contains numerical values for trigonometric functions across various angles.



TRAVERSE TABLES.

Table with columns for degrees (6° to 83°) and trigonometric functions (COSINE, SINE). Rows represent minutes from 00 to 59 for each degree. The table is divided into four quadrants: 6°-45° (top-left), 45°-90° (top-right), 90°-45° (bottom-right), and 45°-0° (bottom-left). Each quadrant contains values for Sine, Cosine, Tangent, and Secant.





TRAVERSE TABLES.

Table with columns for angles (7° to 82°) and trigonometric values (Cosine and Sine) for various degrees and minutes. The table is organized into four quadrants: top-left (Cosine), top-right (Sine), bottom-left (Sine), and bottom-right (Cosine).







TRAVERSE TABLES.

Table with 38 columns and 100 rows. Columns 1-10 are labeled with angles from 7° to 18° and contain 'COSINE' values. Columns 11-37 are labeled with angles from 30' to 21' and contain 'SINE' values. Columns 38-40 are labeled with angles from 72° to 82° and contain 'COSINE' values. The table includes numerical data for each angle combination.

TRAVERSE TABLES.

Table with columns for degrees (7 to 82) and minutes (40 to 49), and rows for COSINE and SINE values. The table is divided into four quadrants: top-left (Cosine), top-right (Sine), bottom-left (Sine), and bottom-right (Cosine).

TRAVERSE TABLES.

Table with 2 columns: COSINE. and SINE. Each column contains 100 rows of data with 10 sub-columns per row (50' to 59'). The table is bounded by 7° and 82° on both sides.

TRAVERSE TABLES.

Table of traverse tables showing Cosine and Sine values for angles from 8 degrees to 81 degrees. The table is organized into two main sections: Cosine (left) and Sine (right), with rows representing degrees and columns representing minutes.

TRAVERSE TABLES.

Table with columns for degrees (8° to 81°), cosine values, and sine values. Includes sub-headers for COSINE and SINE, and a grid of numerical data points.

TRAVERSE TABLES.

Table with columns for degrees (8° to 81°), Cosine, and Sine values. Includes sub-columns for minutes (20' to 29') and seconds (40' to 31').





TRAVERSE TABLES.

Table with columns for angles (8° to 81°) and trigonometric values (COSINE and SINE). The table is organized into two main sections: COSINE and SINE, with corresponding angle markings.









TRAVERSE TABLES.

Table with columns for degrees (90, 80) and minutes (30-39) for COSINE and SINE values. The table is split into two main sections: COSINE (left) and SINE (right), each with a degree marker at the top and bottom. The rows represent degrees from 1 to 100, and the columns represent minutes from 30 to 39. Values are numerical representations of cosine and sine functions.







TRAVERSE TABLES.

Table of trigonometric values for angles from 10° to 79°. Columns include Cosine and Sine values for each degree and minute. The table is organized into sections for Cosine and Sine, with degree markings at 10° and 79°.



TRAVERSE TABLES.

Traverse tables for 10 degrees, providing Cosine and Sine values for various angles and minutes. The table is organized in a grid with 10-degree angles on the left and right margins, and cosine/sine values in the center. The top half (10-90 degrees) shows Cosine values on the left and Sine values on the right. The bottom half (90-10 degrees) shows Sine values on the left and Cosine values on the right.



TRAVERSE TABLES.

Table with columns for Cosine and Sine values, ranging from 10 degrees to 79 degrees. The table is organized into two main sections: Cosine (left) and Sine (right), with a central header for Sine. Each section contains rows of numerical values for every minute of the degree.



TRAVERSE TABLES.

Table with columns for degrees (11°, 78°), COSINE, and SINE, containing numerical values for each degree and minute increment.





TRAVERSE TABLES.

Table with columns for angles (11° to 78°) and rows for cosine and sine values. The table is divided into two main sections: Cosine (top) and Sine (bottom), with intermediate columns for angles and rows for values. The cosine section shows values decreasing from 1.0000 to approximately 0.1736, while the sine section shows values increasing from 0.0000 to approximately 0.9826.

TRAVERSE TABLES.

Table with columns for degrees (11° to 78°) and minutes (30' to 21'). It contains two main sections: COSINE and SINE. Each section has a grid of numerical values for each degree and minute combination. The table is oriented vertically on the page.



TRAVERSE TABLES.

Table with columns for degrees (11° to 78°) and minutes (0' to 59'). It contains two main sections: COSINE (top) and SINE (bottom). Each section has two rows of values corresponding to the degree and minute markings.

TRAVERSE TABLES.

12° COSINE SINE 12° table with columns for degrees (0' to 9') and minutes (0' to 9') for both cosine and sine functions.

TRAVERSE TABLES.

Table with columns for degrees (12° to 77°) and minutes (10' to 19'). It contains two main sections: 'COSINE.' and 'SINE.' with numerical values for each degree-minute combination.







TRAVERSE TABLES.

Table with columns for degrees (12°, 77°) and minutes (40' to 49'). It contains two main sections: COSINE (left) and SINE (right). Each section has rows of numerical values corresponding to specific angles. The cosine values decrease from left to right, while sine values increase from left to right.





TRAVERSE TABLES.

Table with columns for COSINE and SINE, degrees (13 to 76), and minutes (10' to 41').



TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 13° to 76°. The table is divided into two main sections: COSINE (left) and SINE (right), each with 10 sub-columns for minutes. The top and bottom rows are labeled with the degrees 13° and 76° respectively.

TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 13° to 76°. The table is divided into two main sections: COSINE (top) and SINE (bottom), with intermediate columns for SINE and COSINE values. Each row represents an angle in degrees, and each column represents a value. The table includes a grid of numerical values for each angle and minute.

TRAVERSE TABLES.

Table with columns for degrees (13° to 76°), COSINE, and SINE values. The table is organized into two main sections: the top section for angles 13° to 76° and the bottom section for angles 76° to 13°. Each section includes columns for minutes (59' to 10') and corresponding cosine and sine values. The cosine values for 13° are listed at the top and bottom, while sine values are listed in the middle.





TRAVERSE TABLES.

Table with columns for degrees (14° to 75°) and minutes (10' to 19'), containing Cosine and Sine values. The table is divided into two main sections: the top half for Cosine and the bottom half for Sine. Each section has a degree column on the left and a minute column on the right. The central columns contain numerical values for each combination of degree and minute.

TRAVERSE TABLES.

Table with 14 degrees on the left and right sides, and COSINE and SINE columns. The table contains numerical values for each degree and minute interval from 1 to 100 degrees. The cosine values are on the left side of the degree markers, and the sine values are on the right side. The table is organized into 100-degree intervals, with each interval containing 60 rows of 10-minute increments.







TRAVERSE TABLES.

Table with columns for angles (15° to 74°) and values for COSINE and SINE. The table is organized into two main sections: the top section for angles 15° to 74° and the bottom section for angles 74° to 15°. Each section contains two columns of values, one for COSINE and one for SINE, with rows corresponding to the degrees and minutes of the angle.

TRAVERSE TABLES.

Table with columns for angles (15° to 74°) and trigonometric functions (COSINE, SINE). The table is divided into four quadrants: 15° to 45° (top-left), 45° to 74° (top-right), 74° to 90° (bottom-right), and 90° to 15° (bottom-left). Each quadrant contains numerical values for cosine and sine at 1-degree intervals.





TRAVERSE TABLES.

Table containing cosine and sine values for 15 to 74 degrees. The table is organized into two main sections: COSINE and SINE, with sub-sections for 15°, 74°, and 94°. Each section has columns for degrees and minutes (30' to 39'), and rows for the corresponding degree values. The values are arranged in a grid that allows for reading both cosine and sine values for a given angle.





TRAVERSE TABLES.

16° COSINE. SINE. 16°
Table with 100 rows and 19 columns (9 cosine, 1 sine, 9 cosine). Rows are numbered 1 to 100. Columns are labeled 0', 1', 2', 3', 4', 5', 6', 7', 8', 9' under COSINE and SINE. Bottom row shows angles 73° to 73°.





TRAVERSE TABLES.

Table of Trigonometric Values (Sine and Cosine) for angles from 16° to 73°. The table is organized into two main sections: 16° (top) and 73° (bottom). The 16° section contains Cosine values in the center and Sine values on the right. The 73° section contains Sine values in the center and Cosine values on the right. Each section includes a grid of values for every minute of the angle, with degree labels at the corners.



TRAVERSE TABLES.

Table with columns for angles (16° to 73°), COSINE, and SINE. Rows are numbered 1 to 100. Values are listed in a grid format for each degree and minute.

TRAVERSE TABLES.

Table with columns for angles (16° to 73°), Cosine, and Sine. It contains numerical values for various angles and minutes, organized in a grid format.



TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 17° to 72°. The table is divided into two main sections: COSINE on the left and SINE on the right. Each section has a header row for the angle and a grid of values for minutes and seconds. The values are arranged in a grid that is 10 columns wide for each section. The angles are listed on the left and right sides of the grid.

TRAVERSE TABLES.

Table with columns for degrees (17° to 72°), Cosine, and Sine. It contains numerical values for trigonometric functions across various angles.

TRAVERSE TABLES.

17° Cosine Sine 17°
Table with 100 rows and 20 columns. Columns 1-10 are labeled 'COSINE' and columns 11-20 are labeled 'SINE'. The table contains numerical values for each degree and minute combination, with a 17-degree label at the top left and bottom right.



TRAVERSE TABLES.

Table with columns for degrees (17° to 72°) and minutes (50' to 10'). It contains two main sections: COSINE and SINE. Each section has a grid of numerical values corresponding to the degree and minute intersections.





TRAVERSE TABLES.

Table with columns for angles (18°, 10', 11', 12', 13', 14', 15', 16', 17', 18', 19', SINE, COSINE) and rows for values. Includes labels for Cosine and Sine at the top and bottom.



TRAVERSE TABLES.

Table with columns for Cosine and Sine values at 18 degrees and 71 degrees. Includes degree markings (18° and 71°) and numerical data for various angles and minutes.





TRAVERSE TABLES.

Table with columns for COSINE, SINE, and degree markings (19°, 70°). Rows list numerical values for degrees from 1 to 100. The table is symmetric, with COSINE values on the left and SINE values on the right.





TRAVERSE TABLES.

Table with columns for degrees (19° to 70°), cosine values, sine values, and degrees (70° to 19°). The table is divided into two main sections: the top half for cosine and the bottom half for sine. Each section contains a grid of numerical values for every minute of the degree.

TRAVERSE TABLES.

Table with columns for degrees (19° to 70°), Cosine, and Sine. It contains numerical values for trigonometric functions across various angles.

TRAVERSE TABLES.

Table with columns for angles (19° to 70°) and rows for cosine and sine values. The table is divided into two main sections: COSINE (left) and SINE (right), with a central column for angles. Each section contains 10 columns of values for angles from 40' to 49'.

TRAVERSE TABLES.

Table with columns for angles (19° to 70°), COSINE, SINE, and SINE. It contains numerical values for trigonometric functions across various degrees and minutes.

TRAVERSE TABLES.

Main table containing trigonometric values for angles from 20 to 69 degrees. Columns include angle, Cosine values (0 to 9'), Sine values (0 to 9'), and angle again. The table is split into two sections: the top section is for angles 20 to 60, and the bottom section is for angles 60 to 69.





TRAVERSE TABLES.

Table of Traverse Tables showing Cosine and Sine values for angles from 20° to 69°. The table is organized into two main sections: 20° to 69° and 69° to 20°. Each section contains columns for Cosine and Sine values, with rows corresponding to specific angles. The values are presented in a grid format, with some cells containing multiple values for different minutes of an angle.



TRAVERSE TABLES.

Table with columns for degrees (20 to 69), cosine values, sine values, and degrees (69 to 20). It contains trigonometric data for various angles.



TRAVERSE TABLES.

Table with columns for angle (21° to 68°), COSINE, and SINE. It contains numerical values for various angles and their corresponding trigonometric functions.

















TRAVERSE TABLES.

Table with columns for degrees (22 to 67) and minutes (0 to 60). It contains two main sections: COSINE and SINE. Each section has a grid of numerical values for each degree and minute combination. The cosine values decrease from left to right, while sine values increase from left to right. The table is organized into two halves, with the top half labeled '22°' and the bottom half labeled '67°'.

TRAVERSE TABLES.

Table with columns for degrees (22° to 67°), COSINE, and SINE. It contains numerical values for trigonometric functions across various angles and minutes.



TRAVERSE TABLES.

Table with columns for degrees (22° to 67°) and minutes (50' to 59'). It contains two main sections: COSINE (top) and SINE (bottom), with numerical values for each degree and minute combination.

TRAVERSE TABLES.

23°	COSINE.									SINE.									23°		
	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	0'	1'	2'	3'	4'	5'	6'	7'		8'	9'
	1	9205	9204	9203	9202	9200	9199	9198	9197	9196	9195	3907	3910	3913	3915	3918	3921	3923		3926	3929
66°	SINE.									COSINE.									66°		
	60'	59'	58'	57'	56'	55'	54'	53'	52'	51'	60'	59'	58'	57'	56'	55'	54'	53'	52'	51'	





TRAVERSE TABLES.

Table with columns for degrees (23° to 66°) and minutes (20' to 29'). It contains two main sections: COSINE (left) and SINE (right). Each section has a grid of numerical values. The table is bordered by degree markings at the top and bottom.



TRAVERSE TABLES.

23° COSINE. SINE. 23°. Table with columns for degrees and minutes, and rows for degrees. Includes values for Cosine and Sine from 23° to 66°.

TRAVERSE TABLES.

Main table of cosine and sine values for angles from 23° to 66°. The table is split into two sections: the top half for angles 23° to 65° and the bottom half for 66° to 90°. Each section contains two columns of values, Cosine and Sine, with degree markings on the left and right sides. Each row corresponds to an angle, and each column within a section contains 1-degree increments.







TRAVERSE TABLES.

Table with columns for angles (24° to 65°), COSINE, and SINE. The table is organized into two main sections: COSINE on the left and SINE on the right, with angles increasing from 24° at the top to 65° at the bottom. Each section contains a grid of numerical values for every minute of the degree.



TRAVERSE TABLES.

Table with columns for Cosine and Sine, and rows for angles from 1 to 100 degrees. Each row contains values for each degree from 40' to 49' for both cosine and sine.





TRAVERSE TABLES.

Table of Trigonometric Values. Columns include angles (10' to 19'), COSINE, SINE, and angles (50' to 41'). Rows represent degrees from 1 to 100. The table is symmetric and contains numerical values for cosine and sine functions.

TRAVERSE TABLES.

Table of Trigonometric Functions. Columns: 25°, COSINE, SINE, 25°. Rows: 1 to 100. Values range from 0.9999 to 0.2618.



TRAVERSE TABLES.

Table with columns for angle (25° to 64°) and trigonometric values (Cosine and Sine). Includes a large grid of numerical data for each angle and its sub-degrees.

TRAVERSE TABLES.

Traverse tables showing cosine and sine values for angles from 25 to 64 degrees, with columns for minutes and seconds of an angle and rows for corresponding cosine and sine values.



TRAVERSE TABLES.

Table with columns for COSINE and SINE values for angles from 26° to 63°. The table is organized into two main sections: COSINE (left) and SINE (right), each with sub-columns for degrees and minutes. The rows represent angles from 26° to 63° in 1-degree increments. Values are listed in a grid format for each minute.





TRAVERSE TABLES.

Main table containing Cosine and Sine values for angles from 26 to 63 degrees. The table is structured with degrees on the left and right edges, and minutes on the top and bottom edges. The central columns are labeled 'COSINE.' and 'SINE.'.



TRAVERSE TABLES.

Table with columns for angles (26°, 63°) and trigonometric functions (COSINE, SINE). The table contains numerical values for various angles and their corresponding cosine and sine values.

TRAVERSE TABLES.

Table with columns for COSINE and SINE for angles 27° and 62°. Rows are numbered 1-100. The table contains numerical values for trigonometric functions at various minute intervals.







TRAVERSE TABLES.

Table of Trigonometric Values (Sine and Cosine) for angles from 27° to 62°. The table is organized into two main sections: the top half for angles 27° to 62° and the bottom half for angles 62° to 27°. Each section contains two columns: 'COSINE.' and 'SINE.'. Each column has a header row with minutes (30' to 39') and a body of numerical values. The table is flanked by '27°' at the top corners and '62°' at the bottom corners. The right side of the table includes a column for degrees (1 to 100) and another for minutes (1 to 10).



TRAVERSE TABLES.

27° COSINE. SINE. 27°. A large table of trigonometric values for angles from 27 to 62 degrees. The table is organized into two main sections: COSINE and SINE. The top section (27° to 62°) lists cosine values, and the bottom section (62°) lists sine values. Each section contains multiple columns for angles in minutes and seconds, and rows for angles in degrees. The values are numerical, often with leading zeros. The table is bordered by a grid.





TRAVERSE TABLES

Table containing trigonometric values for angles from 28 degrees to 61 degrees, with columns for Cosine and Sine, and rows for angles from 28 to 61.





TRAVERSE TABLES.

Table with columns for angles (28°, 61°) and trigonometric functions (COSINE, SINE). The table contains numerical values for various angles and their corresponding cosine and sine values.

TRAVERSE TABLES.

Table with columns for angles (28° to 61°) and trigonometric values (COSINE and SINE). The table is divided into four quadrants by angle and function type. Each quadrant contains a grid of values for angles from 1 to 100 minutes. The bottom row includes a scale for angles from 10' to 1'.

TRAVERSE TABLES.

Table with columns for angles (29° to 60°) and rows for cosine and sine values. The table is divided into two main sections: Cosine (left) and Sine (right), with a central column for angles. Each section contains 10 columns of values for angles from 0' to 9'.

TRAVERSE TABLES.

Table of trigonometric values for 29 degrees, including Cosine and Sine values for various minutes and seconds, with corresponding degree markings on the sides.

TRAVERSE TABLES.

Table with columns for degrees (29° to 60°), Cosine, Sine, and degrees (60° to 29°). Rows contain numerical values for each degree and minute combination.









TRAVERSE TABLES.

Table containing trigonometric values for Cosine and Sine from 30 to 59 degrees, with sub-columns for minutes and seconds.



TRAVERSE TABLES.

Table with columns for angles (30°, 59°) and trigonometric functions (COSINE, SINE). Rows represent angles from 1° to 100° in 1-degree increments. Each row contains 20 values for cosine and 20 values for sine, with the degree value in the first and last columns.







TRAVERSE TABLES.

Table with columns for degrees (31° to 58°), cosine values, sine values, and degrees (58° to 31°). It includes numerical data for various angles and minutes.

TRAVERSE TABLES.

Table with columns for degrees (31° to 58°) and minutes (0' to 60'), and rows for COSINE and SINE values. Includes degree markings at the top and bottom.



TRAVERSE TABLES.

Table of Traverse Tables showing Cosine and Sine values for angles from 31° to 58°. The table is organized into two main sections: Cosine (left) and Sine (right), with rows corresponding to angles and columns to minutes. The values are listed in a grid format, with some rows containing multiple columns of data.



TRAVERSE TABLES.

Table with columns for angles (31°, 58°) and rows for cosine and sine values. Includes sub-headers for 'COSINE.' and 'SINE.' and numerical data points for each angle and function.

TRAVERSE TABLES.

Traverse tables showing sine and cosine values for angles from 31 degrees to 58 degrees. The table is organized into four quadrants: 31° (top-left), 58° (top-right), 58° (bottom-left), and 31° (bottom-right). Each quadrant contains two columns of values (Sine and Cosine) and rows for each integer degree. The columns are further divided into minutes (1' to 59'). Values are provided in both decimal and fraction forms. For example, at 31°, Sine 50' is 0.8496 and Cosine 50' is 0.5275.



TRAVERSE TABLES.

Table with columns for angles 32° and 57°, and rows for cosine and sine values. Includes sub-columns for minutes (10' to 19') and values for each angle.







TRAVERSE TABLES.

32° COSINE SINE 32°
Table with columns for degrees (32°, 40', 41', 42', 43', 44', 45', 46', 47', 48', 49') and rows for minutes (1 to 100). The table is divided into Cosine and Sine sections.







TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for degrees from 33° to 56°. Each row contains values for 12' intervals, with 30' intervals marked at the start and end of each row. The table is symmetric around the 45-degree line.

TRAVERSE TABLES.

Table with columns for angles (33°, 56°) and trigonometric functions (COSINE, SINE). It contains numerical values for various angles and their corresponding cosine and sine values.







TRAVERSE TABLES.

Table with columns for degrees (34°, 55°) and trigonometric functions (COSINE, SINE). Rows are numbered 1 to 100. Each row contains values for 10-minute intervals.

TRAVERSE TABLES.

Table of trigonometric values for 34° and 55°. Columns include angles in minutes (10' to 19') and values for Cosine and Sine. The table is organized into two main sections: 34° (Cosine on the left, Sine on the right) and 55° (Sine on the left, Cosine on the right).





TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for degrees from 34 to 55. Includes sub-columns for minutes (40' to 49') and seconds (20' to 11').



TRAVERSE TABLES.

Table of traverse tables with columns for degrees (35° to 54°), minutes (0' to 9'), and seconds (00 to 00). The table is divided into two main sections: COSINE and SINE. The COSINE section is on the left, and the SINE section is on the right. Each section contains two rows of data, one for each degree. The values are numerical, representing trigonometric functions for various angles.

TRAVERSE TABLES.

35° COSINE. SINE. 35°. A comprehensive table of trigonometric values for angles from 35 degrees to 54 degrees, including cosine and sine values in both directions.











TRAVERSE TABLES.

Table with columns for angles (36°, 53°) and rows for cosine and sine values. The table is divided into Cosine and Sine sections, with angles increasing from 36° to 53°.



TRAVERSE TABLES.

Table with columns for angles (36°, 20', 21', 22', 23', 24', 25', 26', 27', 28', 29') and rows for cosine and sine values. Includes a section for angles 53° and 58° at the bottom.

TRAVERSE TABLES.

Table with columns for COSINE (36°, 30' to 39') and SINE (36°, 30' to 39'). It contains a grid of numerical values for various angles from 36 degrees down to 53 degrees.



TRAVERSE TABLES.

Table with columns for angles (36°, 40', 41', 42', 43', 44', 45', 46', 47', 48', 49') and rows for values (1 to 100). The table is divided into Cosine and Sine sections. The top section is labeled '36°' and 'Cosine.' and the bottom section is labeled '53°' and 'Sine.'.

TRAVERSE TABLES.

Table with columns for angles (36°, 50', 51', 52', 53', 54', 55', 56', 57', 58', 59', 10', 9', 8', 7', 6', 5', 4', 3', 2', 1') and rows for cosine and sine values. The table is divided into two main sections: COSINE (left) and SINE (right), with 36° at the top and 53° at the bottom.









TRAVERSE TABLES.

Table with columns for angles (37°, 40' to 49') and trigonometric values (COSINE, SINE). Includes row numbers 1-100 and labels for SINE and COSINE at the bottom.

TRAVERSE TABLES.

Table containing trigonometric values (Cosine and Sine) for angles 37 degrees to 52 degrees. The table is organized into two main sections: the upper section for angles 37° to 51° and the lower section for angles 51° to 52°. Each section contains columns for degrees, minutes, and seconds, with corresponding cosine and sine values. The cosine values are listed for the left side of the table, and sine values for the right side. The table is symmetrical around the 45-degree mark, where cosine and sine values are equal. The values are presented in a grid format with rows corresponding to degrees and columns to minutes and seconds.





TRAVERSE TABLES.

Table with columns for angles (38° to 51°), Cosine, and Sine values. The table is organized into two main sections: Cosine (left) and Sine (right), with angles increasing from 38° at the top to 51° at the bottom. Each section contains a grid of numerical values corresponding to specific minutes of the angle.



TRAVERSE TABLES.

Table with columns for angles (38° to 51°) and rows for cosine and sine values. The table is divided into two main sections: Cosine (left) and Sine (right). Each section has a header row for the angle and a grid of numerical values for each minute of the angle.

TRAVERSE TABLES.

Table with columns for degrees (38° to 51°) and minutes (0' to 10'), and rows for COSINE and SINE values. The table is split into two main sections for COSINE and SINE, with degree markers at the corners.















TRAVERSE TABLES.

Table with columns for degrees (39° to 50°), Cosine, Sine, and degrees (39° to 50°). Rows represent degrees and minutes, with numerical values for cosine and sine.













TRAVERSE TABLES.

Table with columns for degrees (40° to 49°), Cosine, and Sine. The table is a standard trigonometric reference table showing values for angles from 40 to 49 degrees. It includes columns for minutes (1' to 59') and seconds (1' to 100' at the bottom). The Cosine values are on the left and the Sine values are on the right.



TRAVERSE TABLES.

Table with columns for angles (41°, 48°) and rows for cosine and sine values. The table is organized into sections for Cosine and Sine, with sub-sections for angles 41° and 48°. Each section contains a grid of numerical values for various angles and minutes.



TRAVERSE TABLES.

41° Cosine Sine 41°
Table with 100 rows and 20 columns for each quadrant. Includes degree markings for 41° and 48°.

TRAVERSE TABLES.

Table with columns for degrees (41° and 48°) and trigonometric functions (COSINE and SINE). It contains numerical values for various angles and functions.

TRAVERSE TABLES.

Table of trigonometric values for 41 degrees. Columns include COSINE and SINE, with sub-columns for minutes (50' to 0'). Rows are numbered 1 to 100. The table is symmetric around the 45-degree mark.





TRAVERSE TABLES.

42° COSINE SINE 42°. Table with columns for degrees (10' to 19') and rows for minutes (1 to 100). It includes sections for SINE and COSINE at the bottom, labeled 47°.



TRAVERSE TABLES.

Table with 100 rows and 24 columns. The top row is labeled '42°' on both ends. The first 10 columns are under 'COSINE.' and the last 10 columns are under 'SINE.'. The bottom row is labeled '47°' on both ends. The first 10 columns are under 'SINE.' and the last 10 columns are under 'COSINE.'. The table contains numerical values for various angles and minutes.



TRAVERSE TABLES.

Table with columns for angles (42°, 47°) and rows for cosine and sine values. The table is divided into two main sections: Cosine (top) and Sine (bottom), each with its own header and sub-headers for angles from 50' to 59'.



TRAVERSE TABLES.

Table with columns for angles (43°, 46°), Cosine, and Sine. It contains multiple rows of numerical data for various angles and minutes.



TRAVERSE TABLES.

Table with columns for degrees (43° to 46°), cosine values, and sine values. It is a standard trigonometric reference table.



TRAVERSE TABLES.

Table with 43° at top left and bottom right. Columns are labeled 'COSINE.' and 'SINE.'. Rows are numbered 1 to 100. The table contains trigonometric values for angles from 43°00' to 46°00'.



TRAVERSE TABLES.

44° COSINE SINE 44°
Table of trigonometric values for angles 44 degrees. Columns include angle in minutes and seconds, and rows list cosine and sine values.









TRAVERSE TABLES.

Table with columns for COSINE and SINE, and rows for angles from 44° to 45°. Each row contains 19 cosine values and 19 sine values corresponding to minutes of the angle.

TRAVERSE TABLES.

Table with columns for angles (44° to 45°) and rows for cosine and sine values. The table is organized into two main sections: COSINE on the left and SINE on the right, with degree markings at the top and bottom.

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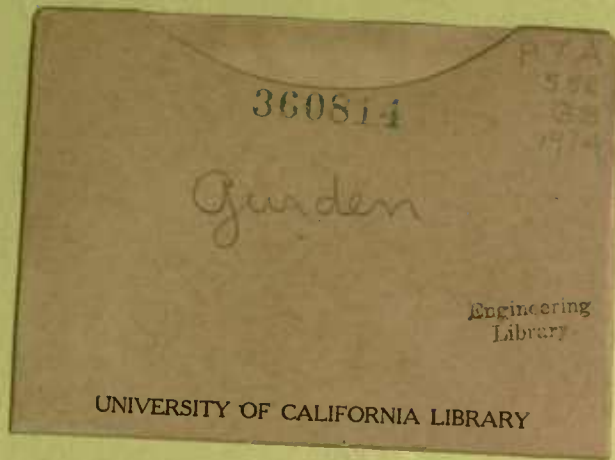
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